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Chapter 4

SOME PSYCHOLOGICAL BENEFITS OF URBAN NATURE: MENTAL VITALITY FROM TIME SPENT IN NEARBY NATURE

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ABSTRACT

A one-time era of vast energy and natural resources allowed an industrial civilization to emerge and flourish. This gift of resources allowed for the building of modern society's infrastructure and the flood of goods and services. Those resources, however, were never limitless. The coming decline in resource availability and quality will significantly alter individual and community life patterns, and initiate a drawn-out transition to a new normal. These changes in the biophysical basis of everyday life will tax our social, emotional and attentional capacities. Individuals will struggle to remain clearheaded and effective while

coping with immutable biophysical limits. It is here that psychology will play a major role since what is being faced is not a technological or political challenge but an existential one.

Psychological research posits that time spent in nature restores our mental effectiveness, emotional outlook and subjective well-being. Furthermore, the full psychological benefits of nature may not require exceptional natural environments such as scenic parks, exquisite gardens or immense green spaces. Everyday nature, even that judged to be mundane, may suffice. This is an important notion since nature in small-scale neighborhood settings is inexpensive to maintain and widely accessible to the vast majority of people. This chapter explores this idea, first by developing the theoretical basis for using ordinary nature to restore mental and social effectiveness and second by presenting a study of two designed residential neighborhoods that differ dramatically on the quality and amount of nearby nature. Results of the study are consistent with theory and prior research in indicating that residents who committed to spending time outdoors in their neighborhood showed greater mental clarity and effectiveness, regardless of the quality of the surrounding natural settings.

Considered together, the theory and results support the suggestion that exposure to nearby nature significantly benefits mental functioning even in the absence of superlative design features. Time spent in everyday nature, which is available to most people, is as effective as experiencing the breathtaking beauty of extraordinary natural settings. The chapter presents these findings as having important implications for citizens who must maintain their mental clarity and emotional stability while responding to trying environmental circumstances. Even under a business-as-usual resource scenario, budget constraints and existing land use patterns make it difficult to create new natural areas. A scenario that includes a reduction of net energy surplus and a descent in natural resource availability makes these findings all the more useful.

Keywords: nearby nature, green exercise, mental vitality, durable living, attention restoration, energy descent

INTRODUCTION

Landscape design and environmental psychology deal with how humans perceive nature, how they affect nature and how they are in turn affected by nature (Herzog, Herbert, Kaplan, & Crooks, 2000; Kaplan & Kaplan, 1998; Matsuoka & Kaplan, 2008; Nassauer, 1995, 1997; Standish, Hobbs, & Miller, 2013). Over three-quarters of the American population now live in urban areas

(Berg, 2012). Cities, towns and villages, with their highly structured settings and designed spatial characteristics, are useful places to explore the relationship between people and nature (Adkins, Dill, Luhr, & Neal, 2012; Grimm et al., 2008; Holling & Orians, 1971; Lee, Min, & Ohno, 2012; Ling & Dale, 2011; Martin & Warner, 1997) and the ways in which people are affected by time spent in nearby natural settings (Bonaiuto et al., 1999; Koren & Butler, 2006; Maas, Verheij, Groenewegen, de Vries, & Spreeuwenberg, 2006; Summers, Smith, Case, & Linthurst, 2012).

The availability of nearby nature (e.g., tree-lined walkways, neighborhood greenery, community gardens, small parks, footpaths, privately-maintained front and side-yard gardens) has long been recognized as an important aspect of residential design (McHarg, 1969). Common sense suggests that the availability of such settings provides support for outdoor activities, including neighborhood walking. But beyond just supporting outdoor behaviors, the everyday availability of and exposure to nature is credited with increased human well-being (Kaplan & Basu, 2015), including important outcomes such as improved attentional functioning (De Young, 2010; Irvine & Warber, 2002; Kaplan & Kaplan, 2003, 1989), stress reduction (Beil & Hanes, 2013; Thompson et al., 2012; Ulrich, 1984; Van Den Berg & Custers, 2011; Wells and Evans, 2003), and other mental health benefits (Pearson & Craig, 2014; Summers, Smith, Case, & Linthurst, 2012). For example, Pretty argues that green exercise, defined as outdoor physical activity in the presence of nature, is an effective means of improving human well-being (2004; 2006; Pretty et al., 2005, 2007).

In addition, it may be incorrect to assume that to realize the full psychological benefits of nature we must experience superlative natural environments such as large parks, designed gardens or idyllic open spaces. The question here is what dose and what quality of nature is sufficient to achieve the desired psychological benefits (see Barton & Pretty, 2010).

A NEW BEHAVIORAL CONTEXT

Answering this question is important due to a number of independent, although interacting, factors. These can be explored by considering two scenarios. The first scenario considers whether, under current social and economic conditions, it will be possible to continue providing exceptional natural settings for social interaction, recreation and mental restoration. The second scenario considers whether it will be possible to support such

outstanding settings under much more austere conditions. The full development of these scenarios, particularly the second one, and their impact on the creation and maintenance of exceptional natural environments in urban settings is a matter deserving of a separate paper. However, these scenarios and their possible effects can be sketched out in enough detail to demonstrate the potential significance of the study reported here.

The first scenario – what might be called a *new-normal condition* – presents its own formidable challenges. There are many research-based recommendations for altering urban settings so as to improve mental and social well-being, including many that involve the use of nearby natural settings. Yet, if a community does not already possess a robust park system, public gardens and/or ubiquitous natural features, the practical limitations of modern community budgets, changing policy priorities and land use restrictions may prohibit creating them under a continuation of the current economic and societal conditions. In fact, it may prove problematic just to continue the operation and maintenance of all existing urban natural settings at the level communities have come to expect over the last half-century.

It is possible that the challenges of this new-normal scenario might relax or be completely removed should a vigorous global and national economy reemerge, and should our social priorities come to value, once again, nearby nature and urban natural spaces. In the meantime, given the reality of current priorities, it would be useful to understand what qualities of nearby nature, and what behaviors in such settings, significantly enhance psychological benefits.

The second scenario – a *protracted resource and energy descent condition* – posits that society soon will face extraordinary resource constraints and, thus, confront social and economic challenges of an even greater magnitude than discussed above. This scenario is consistent with the limits-to-growth notion that was first anticipated in the 1970s (Daly, 1977; Meadows, Meadows, Randers & Behrens, 1972) and then expanded upon during the subsequent decades (Cleveland, Costanza, Hall & Kaufman, 1984; Meadows, Randers & Meadows, 2004). Although the idea often is maligned, the expectation of an end to material growth has recently received renewed attention from both ecologists and economists (Bardi, 2014, 2011; Daly & Farley, 2010; Gordon, 2016; Hall & Day, 2009).

This second scenario envisions a drawn-out ending to our centuries-long consumption and construction binge. This binge, a result of discovering high-quality, cheap-to-extract and easy-to-refine resources, allowed us to build an industrial society with all of its many comforts and conveniences, including urban settlements with both their modern technological infrastructure and

protected natural features. Both individual and collective behaviors have provided society with the amazing array of social and technical innovations that support modernity. But these same behaviors, coupled with the limits-to-growth now being experienced, have also spawned numerous natural resource, environmental and economic challenges, each now shaking industrial civilization. McKibben, in his book *Eaarth* (2010), expresses this idea succinctly: The world onto which we were born has been so disrupted by our resource consumption behavior that it's not the world on which we now live.

Society may be, unknowingly, entering a new biophysical and, as a result, behavioral context. This new context would be one in which the things that were once easy to do (e.g., urban growth, infrastructure development, protecting and maintain large-scale natural features and open spaces) are no longer easy, when they can be done at all (De Young, 2014; De Young & Princen, 2012).

Under either scenario, the allocation of ever more scarce public resources is likely to be directed toward the most pressing social needs. It is reasonable to imagine that establishing and maintaining new natural features, public gardens and aesthetically pleasing green spaces will not be deemed a top priority. Thus, the reality we must live within begins by understanding that, generally speaking, communities must rely on whatever infrastructure they currently possess. These natural and physical features are an inheritance from civic efforts made some years ago; communities will be hard pressed to maintain what exists, let alone expand on it. These challenges would become even more daunting should the second scenario come to pass.

Here, then, we are faced with a classic dilemma. At the very time when the mental vitality necessary for successful coping will be most needed (De Young, 2010), the urban natural settings known to enhance mental vitality will be themselves under threat of neglect. Fortunately, empirical research has found that the presence of even relatively modest amounts of nature in urban settings can have a remarkably positive effect on psychological and social well-being (Kaplan, 2001; Kuo, 2001; Taylor & Kuo, 2008; Wells, 2000; Wells & Evans, 2003). Perhaps existing nearby nature can serve to improve mental clarity and effectiveness throughout either scenario.

But having access to nature may be only a first step. One also benefits from a heightened attentiveness to the natural setting. Duvall (2013, 2011; Duvall & Kaplan, 2015) has studied the role of mental engagement in outdoor natural settings and reports an enhanced effect on psychological well-being from being intentionally and cognitively involved with the many features of nearby nature. His findings suggest that how one moves through and chooses

to experience a setting can amplify the effect of whatever natural features are present. Thus a plan to mentally engage oneself with nearby nature, even if the setting is unspectacular or suffers from neglect, might improve our capacity to direct attention and regulate behavior.

Mental engagement with nature likely is much easier when visual and auditory distractions are fewer. In a study that validated aspects of the *Attention Restoration Theory* (Kaplan & Talbot, 1983; Kaplan, 1995), a walking route through a tree-lined setting that was separated from traffic significantly improved mental effectiveness when compared to a route in the same area and of the same length but featuring a more built-up and noisy character (Berman, Jonides & Kaplan, 2008).

If the ways in which nearby nature benefits people can be more thoroughly understood, there is the potential to leverage these effects. Far more people have access to commonplace, even mundane, nature than have the time or the resources necessary to access large national and state parks, public gardens or wilderness areas. If small scale, nearby natural features of one's neighborhood can be shown to have a positive influence on mental effectiveness, and this fact can be adequately conveyed to planners, practitioners and citizens alike, then restoring mental effectiveness in the immediate future and beyond may be just a stroll away.

STUDY OVERVIEW

This study explores these issues by examining relationships between time spent in neighborhood natural settings and mental functioning. Further it looks beyond aggregate natural features in a community and focuses instead on how individuals' perceived exposure to nearby nature affects their mental effectiveness. Thus, this study explores the following issues:

1. What are the characteristics of residents' perceived exposure to nearby nature?
2. Does spending time outdoors relate to effective mental functioning?

STUDY AREA

Two adjacent communities were selected, Riverside and Berwyn in the US state of Illinois. Both are suburbs of Chicago and offer dramatic contrasting patterns of nearby nature.

Riverside

Riverside, Illinois was developed well over a century ago with the specific intention to provide residents with enhanced pedestrian exposure to nature. Many of the original design features are intact and maintained.

Riverside was the first of more than 30 suburbs designed by Frederick Law Olmsted and his partners. His 1868 report and 1869 plan for the village articulated a mature vision of the suburb as a *refuge* from city life. Olmsted believed the primary attraction of the well-designed suburb was its synthesis of the best features of the country and the city: rural beauty and tranquility combined with urban convenience. Olmsted's application of this aesthetic to the suburb was motivated by a belief in the revitalizing effect of nearby nature on human mental capacities that are worn down by modern urban life (Beveridge, 1997; Olmsted, 1895). As Kaplan notes, "*Olmsted not only understood the possibility that the capacity to focus might be fatigued, he also recognized the need for urban workers to recover this capacity in the context of nature*" (Kaplan, 1995, p. 170).

Riverside has abundant park spaces and well developed vegetation, is of relatively low population density, and has extraordinary provisions for walking and outdoor rambling within its carefully designed and maintained neighborhoods. With all these features, Riverside represents an excellent setting for studying the psychological and health effects of exposure to nearby nature. The expenses and resources it would require to expand or re-create such a setting is unmanageable for many communities under contemporary budget and land-use limitations, and, despite the beauty and appeal of such settings, they will be progressively more difficult to develop and maintain in times of resource scarcity.

Berwyn

Berwyn, Illinois was selected as a community with more typical access to natural features. Although the city of Berwyn, directly to the east of Riverside, was platted at about the same time as Riverside, the designs of the two suburbs are vastly different. While Riverside's roads are curvilinear and follow the natural topography of the site, Berwyn's streets conform to the orthogonal grid characteristic of the Chicago metropolitan area. Berwyn has a more traditional design for an urban community in Middle America with right-angled streets, small lots, and narrow setbacks for houses.

Berwyn is dominated by roads and houses. There are several small parks located throughout the community, but its neighborhood layout and design is not as pedestrian-oriented as is Riverside. Additionally, the natural features of Berwyn, while present and widely dispersed, are not as abundant nor as fully developed as in Riverside. This community provides a useful contrast to Riverside in exploring the effect of nearby nature on mental effectiveness. Neighborhoods like those in Berwyn are exceedingly common in metropolitan and suburban areas, as they are both much less costly to construct and maintain than those in communities like Riverside and more consistent with existing land use patterns.

Community Comparison

In addition to its rich design heritage and abundant public space, Riverside has considerable social resources. Its population is affluent and well educated (Table 1). Yet, despite its many resources, Riverside faces a number of challenges, complicated by its status as a national historic landmark and as an icon of urban landscape design. The village's tax base, never broad because of the lack of extensive commercial development, recently eroded somewhat as businesses left the central business district. Riverside's population lacks diversity, with minority groups constituting only slightly more than one percent of its population in 2000. The lack of affordable housing may be a reason the village has been unable to attract a more diverse population, including young families.

In the first two decades of the twentieth century, Berwyn developed in much the same way as most other Chicago suburbs. It was a place in which, according to the Federal Writers Project (1983), "*harried commuters relaxed in the evening, weeded gardens, set hens, and mowed their lawns*." Today the

city's inhabitants include many working and middle class families, some with Czech and Bohemian roots. These and Berwyn's other ethnic groups, including Italian-, Greek-, Lithuanian-, Polish-, Yugoslavian-and Ukrainian-Americans, have been joined in recent years by Hispanics and young, white ex-urbanites seeking affordable suburban housing near Chicago (Thielen, 2010). Berwyn has been able to attract a diverse population, including young families, possibly because of its affordable homes.

METHODS

In an initial study (Crow, Brown & De Young, 2006) a random sample of Riverside and Berwyn households were selected from household address lists obtained from a commercial vendor, and one resident per household was surveyed by mail. A total of 353 surveys were returned from Riverside and 165 from Berwyn for a total of 518 useable surveys[1]. Respondents to this initial survey were asked if they were willing to participate in a follow-up study. This paper is based on data from that follow-up study. A total of 307 participants agreed to participate in the follow-up study, 222 from Riverside and 85 from Berwyn. The response rate was 63% for Riverside and 52% for Berwyn.

The survey packet included a cover letter, a four-page written survey instrument and a pre-paid return envelope. The cover letter identified the researchers, provided contact and IRB information, explained the researchers' relationship to the cities, and identified exposure to nearby nature as the main focus of the study. The survey consisted of several banks of items recorded on a five-point Likert scale (with the responses ranging from *not at all* to *a great deal*) and measuring the independent variable constructs of psychological demand, neighborhood features, nature involvement, and restorative setting. The dependent variable, effective mental functioning, was measured by two separate constructs, the mindful management of one's daily activities and mental vitality.

[1] When analysis was begun for the initial study, a total of 321 surveys had been returned from Riverside and 150 from Berwyn for a total of 471 useable surveys. Surveys continued to be returned after that initial analysis was completed with the total returned eventually reaching the 518 reported here and used in this analysis.

Table 1. Community Demographics

Riverside	Berwyn
650 ha of land	1010 ha of land
8,700 residents	45,000 residents
93% of residents over 25 have at least a high school degree; 51% have at least a bachelor's degree	29% of residents over 25 have at least a high school degree; 11% have at least a bachelor's degree
67% of residents over the age of 16 are employed; 51% of those in a management or professional occupation	64% of residents over the age of 16 are employed; 26% of those in a management or professional occupation
$64,931 median household income	$43,833 median household income
$264,000 median home value	$133,900 median home value
1% minority population	26% minority population

US Census Bureau, 2000.

Factor analysis using principle axis factoring and varimax rotation was conducted on each bank of survey items to extract categories within residents' responses. Kaplan (1974) has suggested three criteria useful in interpreting factor analysis output. The criteria stipulate that any particular questionnaire item should be included in no more than one category, each category should hang together statistically as indicated by Cronbach's coefficient of internal consistency (Cronbach, 1951; Nunnally, 1978) and the category should make sense, having face validity. These suggestions were operationalized as consisting of eigenvalues ≥ 1.0, factor loadings ≥ 0.5, no double loaders at ≥ 0.5, Cronbach's alpha ≥ 0.7 and researcher judgment of conceptual validity. Following extraction of the categories, new variables were constructed for each by calculating a respondent's average rating on the items that formed each category. This resulted in a single score on each category for each respondent. Riverside and Berwyn results were compared for each category through an independent means t-test, with significance differences reported at $p \leq 0.05$ unless otherwise noted.

RESULTS

In the following sections, each construct is defined and the results for each are discussed in order to describe the respondents, their environments and the qualities of their exposure to nearby nature.

Table 2. Demographics

	Total sample	**Riverside**	**Berwyn**
Respondents (Riverside/Berwyn)	72%/28%		
Gender	52% female		
Age (mean, years)	52	50	45
Highest level of schooling (median)	Four years college	Four years college	Some college

Demographics

The demographic variables for this study were age, gender, and educational level (Table 2). An income question was included on the survey, but it was dropped from the analysis since a large number of respondents declined to provide this information.

The responding population is middle aged with an average of a four-year college degree and an approximately even split between male and female respondents. Respondents are generally similar in terms of their demographic profiles, although Riverside residents have a statistically, but not pragmatically, higher reported age and level of schooling.

Psychological Demands

It is possible that high or low levels of psychological demands would influence effective mental functioning and could moderate the positive effect of exposure to nearby nature. In order to control for this possibility, the participants were asked about how well they had been managing their life recently (Table 3).

The respondents reported a mean for psychological demands near the middle of the five-point Likert scale (3.06), suggesting that they are neither inundated with nor absent these demands. There was no statistically significant difference between the two community-based means.

Table 3. Psychological Demands Category

Category name and items included	Alpha and item loadings	Grand mean	SD	Riverside mean	Berwyn mean
Psychological Demands	**0.90**	**3.06**	**0.85**	**3.04**	**3.12**
I have too much to do	0.77				
There are too many deadlines	0.75				
There are too many pressures on me	0.74				
I have many conflicting responsibilities	0.68				
I get interrupted when working too often	0.65				
My life is very stressful	0.65				
There are too many distractions	0.61				
I have too many responsibilities at home	0.60				
My job is very demanding	0.58				

Neighborhood Features

In order to assess the visual experience of a resident's neighborhood, participants were asked to recall recent time spent outdoors and indicate the frequency of various features they had encountered. Two categories emerged from the factor analysis (Table 4). The categories represent a clear division between natural features (e.g., water, trees) and built features (e.g., buildings, cars). Both of these categories of features are encountered more than occasionally (3.60 and 3.32, respectively) with the difference being statistically significant. Together, these categories capture the mixture of elements present in a typical neighborhood, quite unlike a large park or public garden that might have far fewer built features present.

The Riverside residents reported a significantly higher level of natural features in their time outdoors, while Berwyn residents reported significantly greater exposure to built elements. The difference in means for the natural features category is quite striking; residents of Riverside report encountering a great deal more nature during their neighborhood experiences than did their Berwyn counterparts.

Table 4. Neighborhood Features Categories

Category names and items included	Alpha and item loadings	Grand mean	SD	Riverside mean	Berwyn mean
Natural Features	**0.88**	**3.60**	**1.00**	**4.00**[1,a]	**2.72**[1,b]
Wooded areas	0.86				
Water (stream, pond, river)	0.80				
Natural areas	0.78				
Unpaved paths	0.66				
Trees	0.63				
Community parks	0.61				
Built Features	**0.80**	**3.32**	**1.04**	**3.11**[2,a]	**3.79**[2,b]
Buildings	0.78				
Businesses	0.68				
Cars	0.66				

Means sharing numeric superscripts significantly different at $p \leq .01$.
Means sharing alpha superscripts significantly different at $p \leq .01$.

Nature Involvement

Since nature experiences are an interaction between a person and an environment, an assessment of why and how a person is spending time outdoors is an important part of measuring the effect of their exposure to nearby nature. Two people could spend similar amounts of time in nature, but the quality of their involvement might differ dramatically. For example, being engaged in an intense competitive sport that just happens to be played outdoors versus being intentionally mindful of signs of nature while taking a neighborhood walk may significantly alter the setting's restorative effect. To assess this possibility, a section of the survey instrument asked participants about the kinds of involvement they commonly have with their neighborhood environment. Four categories emerged from the factor analysis (Table 5) including gardening, commitment, relaxation, and sports.

Gardening category – This category, like the sports category discussed below, contains items that are about specific activities respondents are engaged in while outdoors. The gardening items are expressing an intensity of care for plants. Based on the relatively high mean, it seems that respondents spend considerable time in their gardens and yards.

Commitment category – This category is composed of items that reflect an intention to spend time outdoors in all types of weather and in all seasons. The sense is of habitual regularity, steady and ongoing. This category represents a commitment to being outdoors generally; the focus is not on any specific activity nor is there an emphasis on nearby nature. Like the gardening category, the mean response is above mid-scale, suggesting that, as a whole, the respondents are dedicated to being outdoors on a regular basis.

Relaxation category – This category is composed of items that reflect spending time outdoors for the purpose of mental restoration, for meditative walks, to relax, or to get away from daily hassles. There is the sense of using nearby nature, not just the outdoors, as a means of maintaining psychological well-being. There is also a sense that nature itself, not just being out-of-doors, is an important part of the experience.

Sports category – Like the gardening category, these items are about specific behaviors. However, while conducted outdoors, the athletic activities are not necessarily focused on nearby nature. Judging from the mean score on this category, the respondents are not highly involved in outdoor sports.

There were no statistically significant differences between the Riverside and Berwyn respondents for any of the four nature involvement categories. This suggests that the type of involvement with nearby nature is similar across these communities. However, all pairwise comparisons of means, for both communities, were statistically significant. Among the behavior categories measured, respondents in both communities were most likely to garden and least likely to be involved in outdoor sports.

Restorative Setting

A series of items were included that were derived from Attention Restoration Theory (ART, Kaplan & Talbot, 1983; Kaplan, 1995). In principle, the literature argues for many different types of restorative settings. However, research has repeatedly documented the powerful role of natural environments in promoting mental restoration (Berman, Jonides & Kaplan, 2008; Frumkin, 2001; Herzog, et al., 1997; Hill, 2002; Kaplan & Kaplan, 1989; Lee, Williams, Sargent, Williams, & Johnson, 2015; Pretty, 2004). This study included measures to assess if there were differences in the restorative elements and effects when one was outdoors, as reported by residents of Riverside versus Berwyn. The three categories to emerge from the factor analysis (Table 6) were coherence, being away, and fascination.

Table 5. Nature Involvement Categories

Category names and items included	Alpha and item loadings	Grand mean	SD	Riverside mean	Berwyn mean
Gardening	**0.81**	**3.81**	**1.22**	**3.80**	**3.83**
I do a lot of yard work	0.66				
I care for a garden	0.62				
Commitment	**0.88**	**3.60**	**0.99**	**3.63**	**3.58**
I spent time outdoors even in bad weather	0.80				
I went outdoors often	0.75				
I spent time outside many times a week	0.73				
I rarely went outdoors (r)	-0.63				
My weekly routine included going outside	0.61				
I go outside in all seasons	0.58				
I only spent time outdoors if was nice weather (r)	-0.53				
Relaxation	**0.92**	**2.63**	**1.04**	**2.66**	**2.37**
I took meditative walks	0.77				
I went hiking to relax	0.76				
I spent extended time in wooded areas	0.73				
I spent time outdoors for relaxation	0.72				
I went outside to relax	0.67				
I often took walks alone	0.66				
I enjoyed nearby wooded areas	0.66				
I go for very long walks	0.55				
I went outside to get away	0.55				
I exercised outside	0.54				
I spend solitary time in nature	0.50				
Sports	**0.77**	**2.21**	**1.21**	**2.22**	**2.11**
I play sports to relieve stress	0.76				
I do individual outdoor sports	0.72				
I play team sports outdoors	0.62				

All pairwise comparisons of means within the grand, Riverside and Berwyn columns are significantly different at $p \leq .05$.

(r) Indicates reversed scale.

Table 6. Restorative Setting Categories

Category names and items included	Alpha and item loadings	Grand mean	SD	Riverside mean	Berwyn mean
Coherence	**0.88**	**4.00**	**0.68**	**4.15**	**3.65[c]**
The elements went together	0.83				
The surroundings made sense	0.74				
The existing elements belonged there	0.70				
I could rapidly adapt to that setting	0.69				
Being Away from Demands	**0.84**	**3.69[a]**	**0.79**	**3.74[1,b]**	**3.55[1,c]**
I felt free from peoples' demands/expectations	0.82				
I did not need to think of my responsibilities	0.76				
I felt away from my obligations	0.63				
I felt free from work and routine	0.58				
Fascination	**0.72**	**3.61[a]**	**0.85**	**3.76[b]**	**3.21**
The setting had many things that I wonder about	0.73				
Many objects attracted my attention	0.55				

All independent sample comparisons of means are significantly different at $p \leq .01$ except those sharing a numeric superscript.

All pairwise comparisons of means within the grand, Riverside and Berwyn columns are significantly different at $p \leq .01$ except those sharing an alpha superscript.

Coherence category – This category measures people's perception that an environment is cohesive and hangs together well. The overall mean for coherence was quite high (4.00), suggesting that respondents felt strongly that they could visually or spatially understand the setting they were experiencing and navigate it well.

Being away category – This category measures the ability to get away from pressing concerns and mental demands. The overall mean for this measure is moderate (3.69), suggesting that the participants did achieve respite from daily pressures.

Fascination category – This category measures the presence of innately interesting content that allows the mind to focus without willful effort. Attention Restoration Theory posits that in such settings one can rest and, therefore, restore the ability to voluntarily direct attention. Fascination has a moderate mean (3.61), suggesting that participants are spending some time in settings that are innately engaging.

Taken together, the moderate to high means on these three restorative setting elements suggest that residents' time outdoors had the potential to restore their mental vitality. However, in comparing the community mean scores for each of these categories, Riverside residents reported that their recent time outdoors was significantly more coherent and fascinating than did the Berwyn respondents.

There was no difference in community mean scores for being-away from daily demands. This result seems reasonable given that the being away category measures whether the respondents felt that they could choose to leave their mental work and social concerns behind when going outdoors, rather than measuring a physical characteristic of the neighborhood setting itself.

Dependent Variable: Effective Mental Functioning

Two categories of the dependent variable (effective mental functioning) that emerged from the factor analysis (Table 7) were mindful management and mental vitality. There were no statistically significant differences for either category when comparing the means of the Riverside and Berwyn respondents. Within-community comparisons of the category means were also not statistically significant.

Mindful management category – This category assesses the capacity of an individual to process information, keep track of tasks, and manage their mental load during daily life. Overall the participants reported a modest mean score on mindful management (3.72).

Mental Vitality category – This category measures how much mental energy or vigor an individual feels they have in their everyday life. While the items that compose the mental vitality category could be related to a long-term assessment of mental vitality, the items were framed in terms of a person's current state-of-mind. Participants reported a modest level of mental vitality (3.71).

Table 7. Effective Functioning Categories

Category names and items included	Alpha and item loadings	Grand mean	SD	Riverside mean	Berwyn mean
Mindful Management	**0.92**	**3.72**	**0.66**	**3.75**	**3.64**
Following through on your plans	0.73				
Keeping your mind on what you are doing	0.72				
Finishing things you have started	0.71				
Deciding what is most important to work on	0.69				
Remembering to do all things you started to do	0.66				
Being clear and focused in your thinking	0.66				
Making up your mind	0.60				
Planning your daily activities	0.59				
Keeping track of things	0.55				
Knowing what is important for you	0.54				
Doing things that take effort	0.53				
Reflecting on what you have accomplished lately	0.51				
Mental Vitality	**0.88**	**3.71**	**0.80**	**3.74**	**3.63**
I feel energized	0.71				
I feel alive and vital	0.70				
I have energy and spirit	0.69				
I don't feel very energetic (r)	-0.69				

(r) Indicates reversed scale.

Regression Analysis

Regression analyses were conducted on both of the effective mental functioning categories. Initially the demographic variables were included, but

they proved non-significant and were dropped from subsequent analysis. The regression analysis was conducted in three phases in order to control for the respondents' psychological demands and community (i.e., Riverside, Berwyn) before examining the effects of nearby nature exposure. First, the psychological demand category was entered to control for this precondition. Second, the community was controlled for. Finally, the neighborhood features, nature involvement, and restorative setting categories were all entered into a stepwise regression (.05 threshold to enter, .10 threshold to leave) (Tables 8 and 9).

Predicting Mindful Management – Psychological demand was significantly and negatively related to mindful management, accounting for about five percent of the variance. The community variable (i.e., Riverside, Berwyn) had no statistically significant influence on mindful management. Having removed the variance for these two preconditions, mindful management was found to be significantly and positively predicted by four categories of the independent variables: coherence, commitment, natural features, and gardening. In combination, these categories accounted for about thirteen percent of the variance in mindful management.

The results for mindful management are consistent with the Attention Restoration Theory. Participants of this study whose neighborhood experiences had more natural features and were more coherent were also more likely to report higher capacity to mindfully direct their lives. Additionally, regularity of involvement with nearby nature and with gardening as an activity contributed to positive mindful management outcomes. Since there is little reason to assume that people of higher cognitive capacity are more likely to seek out nearby nature or have more commitment to gardening, these findings suggest that the kinds and characteristics of people's neighborhood and experiences are influencing their mindful management of daily life.

Predicting Mental Vitality – The psychological demands category accounted for over two percent of the variance in mental vitality and, as with mindful management, the relationship was negative. The community variable had no statistically significant effect on mental vitality. After controlling for these two conditions, the regression identified significant effects for a combination of commitment, coherence and involvement in outdoor sports. These were responsible for just over sixteen percent of the variance in mental vitality. Neither of the neighborhood features categories had a significant effect on mental vitality.

Table 8. Regression on Mindful Management Category

	Beta	**R^2 Change**	**Significance**
Psychological Demands	-0.24	4.8%	.05
Community (Riverside/Berwyn)	0.11	0.4%	ns
Restorative Setting: *Coherence*	0.23	7.3%	.001
Nature Involvement: *Commitment*	0.14	2.7%	.01
Neighborhood Features: *Natural*	0.16	2.0%	.05
Nature Involvement: *Gardening*	0.12	1.3%	.05
Total R^2		**17.1%**	

Table 9. Regression on Mental Vitality Category

	Beta	**R^2 Change**	**Significance**
Psychological Demands	-0.22	2.5%	.01
Community (Riverside/Berwyn)	0.04	0.3%	ns
Nature Involvement: *Commitment*	0.22	8.6%	.001
Restorative Setting: *Coherence*	0.26	6.0%	.001
Nature Involvement: *Sports*	0.14	1.9%	.05
Total R^2		**19.3%**	

The significant predictors of mental vitality suggest the importance of consistency on maintaining our mental well-being. The findings suggest that time spent outdoors is important, but the specific setting chosen for such activity may not be critical. Getting outside in a place that is coherent is important. However, while there is a clear relationship between being outdoors and mental vitality, there is no indication in these findings that particular environmental features are essential.

Summary of Regression Findings

Overall, exposure to neighborhood nature has a positive impact on the mindful management of mental effectiveness. In addition, gardening, a nature-based activity, also contributed to effectiveness. Overall, spending time outdoors generally had a positive impact on mental vitality, but nothing emerged to suggest that specific environmental features, or the quality of these features, cause this effect. However, in both regression analyses, a

combination of being in a coherent environment and commitment to being outdoors had a significant positive influence on effective mental functioning.

Perhaps most fascinating is that where participants experienced nearby nature (i.e., Riverside, Berwyn) had no significant effect on their mental effectiveness as measured by the dependent variables of mindful management and mental vitality. While there were clear differences in terms of the balance of natural and built features in these two communities, these physical differences did not emerge as significant.

DISCUSSION

Overall, the findings suggest that the benefits of exposure to nearby nature on one's mental effectiveness are not dependent on the exceptional environmental features present in Riverside, but are instead also available to residents of more typical urban communities. This is a promising lesson for the field of psychology in planning for a resource-limited future; as biophysical limits initiate a long, drawn-out resource and energy descent, ordinary natural settings can enhance the mental vitality necessary to cope with the challenges faced by modern industrial society. This message can be expanded into a series of design and behavioral prescriptions.

1. *Spending time in nearby nature can have a positive effect on a person's mental well-being.* Effective mental functioning is related to how informationally supportive the neighborhood setting is, particularly with regard to its coherence. Being in a physical environment that is easily understood, where one can easily navigate, has a positive effect on a person's mental functioning.
2. *Superlative or idyllic nature settings are <u>not</u> needed to achieve positive cognitive effects; residents can get benefits from commonplace natural settings.* Mental restoration occurred from time spent outdoors in both communities. This is encouraging for two reasons. First, it means that residents need not travel to distant parklands or public gardens to achieve mental restoration. Second, from a practitioner's perspective, this means that the emphasis can be on developing opportunities and encouragement for spending time outdoors in the everyday natural settings of existing neighborhoods rather than pursuing major new development, renovation, or programming. The former approach is likely to be highly cost-

effective and more widely available in modern society, and thus quickly benefit resident well-being in all community types. Furthermore, settings comprised of nearby, even mundane, nature can continue to be a resource for large numbers of people during the leaner times ahead.

3. *Commitment to spending time outdoors is an important factor in achieving mental effectiveness.* In none of the regression findings did the specific community have an effect on the outcome measures: Berwyn residents were as successful as Riverside residents at gaining the benefits of nearby nature. However, there was a significant positive relationship between commitment to spending time outdoors and mental effectiveness. This suggests that the benefits that can be derived from everyday nature do not accrue without intention and effort on the part of the resident. Just being outdoors may not be sufficient; one's mind must be engaged with the setting's natural features.

The significance of the commitment notion suggests that if a person only infrequently and inattentively spends time outdoors, they may not receive enough exposure for the positive effects to accrue. This is consistent with the work of Duvall (2013, 2011; Duvall & Kaplan, 2015), which suggests that strategies that encourage more active forms of engagement leverage the positive effects of outdoor activity. However, here too the data suggests that an extreme approach may not be called for. The lack of significance for the relaxation category suggests that one may not need to have a comprehensive plan solely focused on seeking mental restoration in order to achieve that very benefit. People have to avail themselves of their neighborhood environment regularly and intentionally attend to its features, but it is spending time outdoors, not pursuing specific goals or behaviors once there, that seems important. This is helpful because it may be easier to encourage people to spend time outdoors pursuing a variety of activities while simultaneously appreciating natural features than it is to get people to spend time outdoors for the sole purpose of achieving mental effectiveness. So within a biophysical context of energy descent, people who attend to their everyday natural settings when opportunities arise will be better able to remain clearheaded and effective. Thus, they will be better able to cope with whatever behavioral transitions are necessary than they would be otherwise.

In conclusion, it appears that restoring mental effectiveness requires nothing more than commonplace outdoor activities in everyday environments.

In fact, since everyday nature appears sufficient, there may be no special advantage to spending time in spectacular environments. This is fortunate, because development of such environments will not be feasible for communities with constrained budgets, less cheap energy, and fewer resources. Simply spending time surrounded by everyday nature may be all that is needed to restore the effectiveness needed to deal with environmental challenges. Nothing extreme is required; indeed, an evening stroll through the neighborhood or a morning of gardening may be enough.

There are many reasons for us to expand old and develop new parks and natural environments. For the purpose of maintaining our mental effectiveness, however, the existing infrastructure that previous generations provisioned for us may suffice. In effect, stimulating awareness and use of existing nearby natural settings is likely an inexpensive and widely applicable option. In a business-as-usual energy and resource scenario, these types of settings will remain available. In time, they may become all the more valuable if we must rise to the challenge of living and thriving on less.

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